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A STATION FOR CROTON GLANDULOSUS IN NEW JERSEY.

BAYARD LONG.

SOME years ago, during an examination of the private herbarium of Mr. W. H. Roper of Atco, New Jersey, I came unexpectedly upon local material of *Croton glandulosus* L.¹ Mr. Roper was quite familiar with the plant and informed me that it occurred along the railroad above Bishops Bridge—a flag-stop near Atco. This spot is along the steam line of the Pennsylvania Railroad to Atlantic City, about twenty miles out of Camden.

Croton glandulosus is a tropical American species of sandy soils, extending northward in the Mississippi valley to Iowa and through the southeastern states to Virginia. In the northeastern United States it is best known historically, as one of the ballast-ground plants formerly found about certain of the Atlantic seaports. In Aubrey H. Smith's paper on "On Colonies of Plants Observed near Philadelphia,"² published in 1867, it is reported to have occurred below the Navy Yard from 1864 to 1866, being "more abundant in the last of these years"—which is amply borne out by numerous specimens dated 1866 contained in various herbaria. There are collections from Kaighn's Point, Camden, New Jersey, opposite Philadelphia, made in the same year, as well as in 1865. It was obtained in 1866 at Newcastle, Delaware, not very far below Philadelphia. A single plant only, however, was noted, according to the label-data with the extant material in the Commons Herbarium, and there is no evidence that the species occurred there subsequently.

¹ The northern, widely distributed phase of this very variable species known as *C. glandulosus* var. *septentrionalis* Muell. Arg.

² Smith, Proc. Acad. Nat. Sci. Phila. xix. 22 (1867).

The last collection appears to have been in 1879 from the ballast-grounds at Philadelphia. It is not possible to say whether the plants collected in the later years of this period were descendants of the first colonists, but it seems unlikely. Comparatively few of these ballast plants persisted, and collections of a species over a lengthy period frequently seem to represent repeated cases of colonization. There were periods of renewed interest in the ballast-grounds during more recent years, particularly in the late 90's, but the species was not found at this time.

Mr. Roper's collection near Bishops Bridge show that it occurred there as early as 1913. Because of my interest expressed in the plant he visited the station again in 1918 and reported it in some abundance, fruiting copiously, and evidently increasing. When, on October 5 of the past year, my long deferred visit was made, I was amply repaid by the sight of many hundreds of vigorous plants.

The railroad at this spot extends across a low depression and has been laid upon a stone-and-cinder fill. On the long, sloping railroad bank the croton has found a favorable habitat, with numerous other weeds that like loose cinder railroad-ballast. For more than a hundred feet along this slope the croton is the most conspicuous, if not the dominant species. At the foot of the slope, among the weeds of ranker growth and the native vegetation encroaching from the low ground, the plants were tall and slender, some approaching two feet in height; while at the crest of the bank those growing in the dry, sun-baked cinders, having had little growth-competition, were stout little "bushes" about a foot tall. At the time of my visit the somewhat shaded plants were still fresh and green; those in the open were in greater maturity and made really very handsome foliage-plants with their drooping, primary leaves turning a rich salmon color. All were fruiting profusely and apparently prepared to continue flowering and fruiting indefinitely. Probably only killing frosts terminate its growing season in this latitude. The railroad company's scythe that makes periodical raids upon the vegetation along the tracks seems not to have discouraged the plant. Those individuals that were cut down appeared to have suffered only a judicious pruning, resultant in a greater branching and increased fruiting.

The presence of considerable paper and rubbish along the railroad bank suggests that car-sweepings may be dropped here. This is

undoubtedly a fertile source of introduction of many railroad weeds. And possibly this colony of *Croton glandulosus* may have originated in such manner.

Although the plant was not detected at any other station along the railroad, the vigorous manner in which the species is establishing itself at this spot leaves no doubt in the mind that it is only a question of time when it will have extended further along the railroad, or even out into the adjacent sand-barrens.

It is said to be a weed in portions of its range, and like many crotons and allied species of the spurge family, to have an especial fondness for railroads. At least one of its stations in Virginia, the state usually given as the northern limit of the species, is "along the railroad between Lynchburg and Danville" and probably other occurrences on the outer edge of its range are of a similar character. It would thus appear that the plant at Bishops Bridge has found a very congenial habitat and it would not be surprising if what is now such an unfamiliar species to local collectors should ultimately become a familiar member of the New Jersey flora.

ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

THE GRAY HERBARIUM EXPEDITION TO NOVA SCOTIA, 1920.

M. L. FERNALD.

(Continued from p. 195.)

Panicum lindheimeri Nash. As already noted (p. 141) there is no constant character by which to distinguish from *P. lindheimeri* the several plants subsequently published as species and separated by Hitchcock & Chase upon the minutest differences in size of spikelets and varying degrees of pubescence on the foliage. These plants, *P. tennesseense* Ashe, *P. huachucae* Ashe, and *P. implicatum* Scribner, have for a quarter-century baffled those who, not restricting their studies to the grasses, are in the habit of looking in other plants for essentially constant characters in species and who have long since learned that in other groups at least, fluctuating degrees of the same type of pubescence when unaccompanied by definite characters of the inflorescence give very unsatisfactory grounds for specific separa-

tion. More recently, further perplexity has been added to the group for those who are not intensive specialists on *Panicum* by the publication of *P. languidum* Hitchc. & Chase. The type collection was a clump growing in dry woods at South Berwick, Maine, with spikelets unusually large (1.8–2.1 mm. long) but otherwise not different from lax shade-forms of *P. huachucae*, the individuals of rich or shaded habitats separated by Hitchcock & Chase as *P. huachucae*, var. *silvicola*. The authors of *P. languidum* cite five collections: South Berwick, Maine, *Fernald*, *Parlin* (from the same clump); Island Falls, Maine, *Fernald*; Mt. Desert Island, *Fernald*; Ashburnham, Massachusetts, *Harris*; and Platte Clove, New York, *Williamson*.

I have not seen the New York material, but the South Berwick clump was broken into several full-sized sheets, three of which are before me. Their spikelets range from 1.8–2.1 mm. long (not merely 2 mm. as originally described) and the panicle is, as described by Hitchcock & Chase, "loosely flowered, the very flexuous branches finally spreading or drooping . . . the axis and branches sparsely long-pilose." The inflorescence is thus like the theoretical inflorescence of *P. implicatum* but looser and with longer spikelets or quite like that of many specimens determined by Hitchcock & Chase as *P. huachucae*, var. *silvicola*, a plant which they describe as having spikelets 1.6–1.8 mm. long. The leaves of the South Berwick material are inseparable from those of the latter plant. The other Maine specimens of *P. languidum* are like the type as are more recent collections from Massachusetts, but the Harris collection from Ashburnham, included with the original *P. languidum*, is quite different, having narrowly ellipsoid panicles with strongly spreading-ascending branches, the axis smooth and the sheaths pilose with ascending (not wide-spreading) hairs. This collection is represented by three sheets, thoroughly uniform and clearly a shade state of *P. subvillosum* Ashe. With the latter species eliminated from the complex, *P. languidum* is left as a series of specimens which in every character merge directly into *P. huachucae*.

The original of *P. Lindheimeri* was a plant with the axis of the panicle glabrous and with the lower internodes and sheaths papillose-hirsute, the upper glabrous, and Hitchcock & Chase place it in their section *Spreta* because it has "Sheaths glabrous or only the lowermost sometimes pubescent." *P. huachucae*, on the other hand, and

P. tennesseense are placed in the section *Lanuginosa* with "Sheaths strongly pubescent." The spikelet-measurements as given by them are: *P. Lindheimeri*, 1.4–1.6 mm. long; *P. huachucae* 1.6–1.8 mm. and *P. tennesseense*, 1.6–1.7 mm. The last, although placed in a group with "Sheaths strongly pubescent," is described as having "sheaths . . . rarely nearly glabrous," while in the "glabrous" *P. Lindheimeri* "sometimes the pubescence extends nearly to the summit. These more pubescent specimens . . . resemble less pubescent specimens of *P. tennesseense* but can be distinguished by the smaller spikelets." If the difference between the extremes of the spikelets were positive, the latter assurance would carry conviction; but when, measuring the spikelets of specimens labelled (and often cited) by Hitchcock & Chase as *P. tennesseense*, it is found that several sheets (Framingham, Mass., *E. C. Smith*; Providence, R. I., *Collins*; East Hartford, Conn., *Driggs*; Washington, D. C., *Steele*; Monteer, Mo., *Bush*; etc.) show mature spikelets only 1.4–1.6 mm. long, while this minimum is exhibited by a sheet specially collected by Mrs. Chase and distributed to show true *P. tennesseense* (Am. Gr. Nat. Herb. no. 127); — when we find that *P. tennesseense* may have spikelets as small as in *P. Lindheimeri*, the effort to separate the two as species becomes futile. This futility is further emphasized by the plant of Yarmouth County, Nova Scotia, in habit so closely similar to the type-number of *P. Lindheimeri* as at first to seem identical with it, but with spikelets even larger than in *P. tennesseense*, 1.8–2 mm. long.

Panicum tennesseense, itself, as treated by Hitchcock & Chase, consists of two rather definite trends. Of the material in the Gray Herbarium and the herbarium of the New England Botanical Club so named by them 18 sheets have panicles with the lower internodes pilose as in *P. huachucae*, var. *silvicola*, which likewise has spikelets of the same size; while 25 have the axis of the panicle glabrous as in *P. Lindheimeri*. Some sheets of the latter plant from the St. John valley in northern Maine have been labeled by them *P. Lindheimeri*; others of the same plant, *P. tennesseense*. One sheet from Massachusetts (*Hubbard*, no. 205) with the characteristic panicle, long spikelets and pilose axis of *P. languidum* was determined by Mrs. Chase in 1911 as the latter species, but, naturally enough, in 1912 she changed the determination to *P. tennesseense*; naturally enough because, as the preceding discussion indicates, those species are merely phases of one polymorphous species, *P. Lindheimeri*.

Similarly with *P. huachucae* and *P. implicatum*, the lines between these and the others are vague, Hitchcock & Chase saying in a note upon the shade-state of the former (*P. huachucae*, var. *silvicola*), "The following specimens represent an extreme form with the upper surface of the blades nearly or quite glabrous, thus approaching *P. tennesseense*." Then follows an enumeration of 19 specimens to which the more recent collections would surely add many more, but the citation of 19 confessed intermediates is sufficient indication of the weakness of the species. *P. implicatum* is the extreme of the series with longest pubescence on the leaves, in its best development well pronounced but, to quote Hitchcock & Chase's apt phrase: "More robust specimens of *P. implicatum* approach *P. huachucae*." In New England and eastern Canada the distinctions between the two are most unsatisfactory and at best *P. implicatum* seems to be of varietal rank, as Scribner, who first published it as a species in 1898, regarded it in 1901.

Others, like *P. pacificum* Hitch. & Chase, seem hardly separable as species. *P. pacificum* has spikelets tending to be minutely larger than in *P. huachucae*; and its authors reason that, although "It most nearly resembles *P. huachucae*," it cannot be included in that species because of "a distinct range." The type of *P. huachucae* came from Huachuca Mts., Arizona, and Hitchcock & Chase cite material from San Bernardino Mts., California, while they allow *P. pacificum* to occur also in the San Bernardino Mts. and to extend eastward into Arizona. The ranges of the two are thus overlapping, the habit, foliage and pubescence identical, and the spikelets with overlapping measurements.

The variations above discussed seem better treated as a series of varieties of one wide-ranging and polymorphous species, as follows:

- Axis of panicle glabrous or at most with few appressed hairs:
 leaf-blades glabrous or very sparsely pilose and glabrate
 above, glabrous or minutely pubescent beneath; upper
 sheaths glabrous to somewhat pilose.
 Spikelets 1.3-1.6 mm. long. Var. *typicum*.
 Spikelets mostly 1.6-2 mm. long. Var. *septentrionale*.
 Axis of panicle spreading-pilose, at least on the lower inter-
 nodes: leaf-blades pilose to glabrous above, commonly
 pubescent beneath; upper sheaths mostly pilose.
 Spikelets mostly 1.6-2.1 mm. long: leaf-blades closely
 short-pilose, sparsely long-pilose or glabrous above. Var. *fasciculatum*.
 Spikelets mostly 1.3-1.5 mm. long: leaf-blades long-pilose
 above, with hairs mostly 3-6 mm. long. Var. *implicatum*.

P. LINDHEIMERI Nash, var. **typicum**. *P. Lindheimeri* Nash, Bull. Torr. Bot. Cl. xxiv. 196 (1897); Hitchcock & Chase, Contrib. U. S. Nat. Herb. xv. 203 (1910). *P. Funstoni* Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Circ. xxxv. 4 (1901).—California to Florida, north to Minnesota, southern Ontario and New England.

**** Var. septentrionale**, n. var. *Planta* laxa vel dense cespitosa 2–7 dm. alta; vaginis glabris vel plus minusve pilosis pilis divergentibus, laminis firmis utrinque glabris vel sparse breviterque pilosis; paniculis primariis ovoideis 2.5–7 cm. longis rhachi glabro; spiculis plerumque 1.6–2 mm. longis.—Nova Scotia and New Brunswick to Manitoba, south to Connecticut, New York, Indiana and Missouri. The following are representative of a series of about 100 sheets studied. NOVA SCOTIA: wet sphagnum swale at border of Beaver Lake, Yarmouth Co., July 25, 1920, *Long & Linder*, no. 19,805, October 6, 1920, *Fernald & Linder*, no. 19,814 (unusually tall and little tufted from growing in a dense swale). NEW BRUNSWICK: river-gravels and shingly border of thicket by the St. John River, Woodstock, July 14, 1916, *Fernald & Long*, no. 12,527 (TYPE in Gray Herb.); recent clearing, Ingleside, Westfield, August 7, 1909, *Fernald*, no. 1255; gravelly shore of the basin, Gorge of the Aroostook River, *Fernald*, no. 1250. MAINE: St. John River at mouth of Little Black River, July 27, 1900, *Collins & Williams*; gravelly shores of St. John River, St. Francis, August 5, 1893, *Fernald*, no. 166a; Fort Kent, August 1, 1900, *Collins & Williams*; river-thicket, Fort Fairfield, August 10, 1909, *Fernald*, no. 1257; sandy river-bank (Penobscot River), Bradley, September 16, 1897, *Fernald*; sandy clearings and pastures, Fairfield, July 24, 1916, *Fernald & Long*, no. 12,751; dry wooded slope of Mt. Megunticook, Camden, August 13, 1913, *Fernald*; in sand, Canton, July 7, 1906, *Parlin*, no. 1958; edge of cliff, Ogunquit, Wells, July 15, 1903, *Parlin*, no. 1577. NEW HAMPSHIRE: sandy pasture, Shelburne, July 21, 1913, *Deane*; roadside, Stewartstown, July 19, 1917, *Fernald & Pease*, no. 16,826; railroad track, Stratford, July 18, 1917, *Fernald & Pease*, no. 16,810; dry soil, Northumberland, *Fernald & Pease*, no. 16,811; gravelly bank of Pemigewasset River, North Woodstock, July 7, 1915, *Fernald*, no. 11,515; sandy river-terraces above Plymouth, July 30, 1915, *Fernald*, no. 11,516; Nashua, June 24, 1903, *Robinson*, no. 789. VERMONT: Willoughby Mt., Westmore, *Horace Mann et al.* (axis slightly pubescent, approaching that of var. *fasciculatum*). MASSACHUSETTS: gravel, Manchester, July 15, 1913, *Hubbard*, no. 655; Holbrook, June 18, 1899, *Greenman*, no. 3133; Rehoboth, June 22, 1914, *Forbes*; sand-plain, Springfield, June 8, 1913, *Fernald*, no. 8650; woodroad near Shaw Pond, Becket, July 28, 1916, *Hoffmann*; rocky roadside, Mt. Washington, August 11, 1914, *Hoffmann*; wet sandy roadside, Stockbridge, June 20, 1914, *Hoffmann*; dry clearings and open woods on sericite schist, near summit of Serpentine Ledge, Florida, June 24, 1913, *Fernald & Long*, no. 8620. RHODE ISLAND: sterile meadow,

Warwick, June 25, 1910, *Fernald*. CONNECTICUT: sandy soil, South Windsor, June 23, 1916, *Driggs*; dry soil, Manchester, July 9, 1904, *Driggs*, no. 2927; wet meadow, Southington, July 13, 1901, *Andrews*; moist roadside, Danbury, July 19-20, 1912, *Harger*. NEW YORK: bank of St. Regis River, Stockholm, July 1, 1916, *O. P. Phelps*, no. 1450; swamp, Norfolk, June 30, 1915, *Phelps*, nos. 1100, 1101; dry rocks, Murray Island, Jefferson Co., July 4, 1902, *Robinson & Maxon*, no. 86; sandy fields, Albany, June 10, 1918, *House*; dry gravel, Ulysses, July 22, 1913, *Wiegand & Palmer*, no. 89. ONTARIO: Cache Lake, Algonquin Park, June 20, 1900, *Macoun*, no. 72,965 in part (mixed with *P. boreale*); Toronto, June 7, 1911, *J. White*, no. 8. INDIANA: sand ridges, Roby, September 2, 1907, *Lansing*, no. 2687; swale, Edgemoor, July 24, 1906, *Lansing*, no. 2606; sand ridges, East Chicago, August 10, 1910, *Lansing*, no. 2801. MANTIOBA: Lake Winnipeg Valley, 1857, *Bourgeau*. MINNESOTA: moist sand, Hubert, July 25, 1913, *Bergman*, no. 2879. MISSOURI: barrens, Monteer, May 24, 1907, *Bush*, no. 4684.

Var. **fasciculatum** (Torr.), n. comb. *P. dichotomum*, β . *fasciculatum* Torr. Fl. No. and Mid. U. S. 145 (1824). *P. nitidum* α . *ciliatum* and δ . *pilosum* Torr. l. c. 146 (1824). *P. huachucae* Ashe, Journ. Elisha Mitchell Soc. xv. 51 (1898). *P. tennesseense* Ashe, l. c. 52 (1898). *P. unciphyllum*, forma *prostratum* Scribn. & Merr. RHODORA, iii. 124 (1901). *P. languinosum*, var. *huachucae* (Ashe) Hitchc. RHODORA, viii. 208 (1906). *P. huachucae*, var. *silvicola* Hitchc. & Chase in Robinson, RHODORA, x. 64 (1908). *P. pacificum* Hitchc. & Chase, Contrib. U. S. Nat. Herb. xv. 229 (1910). *P. languidum* Hitchc. & Chase, l. c., 232 (1910). *P. huachucae*, var. *fasciculatum* (Torr.) Hubbard, RHODORA, xiv. 171 (1912).—Southern California to Florida, north to southern British Columbia, Idaho, Montana, South Dakota, Minnesota, Ontario, Quebec and Newfoundland.

In its typical form the variety has loosely spreading leaves. *P. huachucae* is a trivial form, of more open habitats and therefore with stiffer and more ascending foliage. *P. unciphyllum*, forma *prostratum* (basis of *P. languidum*) is a shade form with tendency to looser inflorescences and slightly longer spikelets.

In Nova Scotia var. *fasciculatum* is common from Yarmouth to Sable Island and Pictou Co.

Var. **implicatum** (Scribn.), n. comb. *P. implicatum* Scribn. U. S. Dept. Agric. Div. Agrost. Bull. 11: 43. fig. 2 (1898). *P. unciphyllum implicatum* Scribn. & Merrill, RHODORA, iii. 123 (1901).—Newfoundland to southern New York, west to Ontario, Wisconsin and Iowa.

Common in western Nova Scotia, often too close to the last.

P. SUBVILLOSUM Ashe. Common on dry sandy or rocky open soil throughout the silicious regions from Yarmouth Co. to Halifax and Cumberland Cos., thence on into eastern New Brunswick and Prince Edward Island. See p. 103.

* *Setaria viridis* (L.) Beauv., var. *Weinmanni* (R. & S.) Brand; Fernald & Wiegand, RHODORA, xii. 133 (1910). This easily recognized variety, now widely dispersed as a weed in eastern Canada, occurs in the railroad yard at North Sydney and presumably elsewhere.

** LEERSIA ORYZOIDES (L.) Sw., forma CLANDESTINA E. H. Eames, RHODORA, xviii. 239 (1916). This form seems to be more common in Nova Scotia than the typical form of the species, with exserted panicles. In all our Nova Scotian collections of both forms the spikelets are unusually long, 5–6 mm.

** L. ORYZOIDES, forma GLABRA A. A. Eaton, RHODORA, v. 118 (1903). In New England this form is characteristic of tidal flats, but in Trefry's Lake, Arcadia (Yarmouth Co.) completely submersed colonies had the sheaths essentially as smooth as in Eaton's original material, thus suggesting that the smoothness is a result of submergence.

MILICUM EFFUSUM L. To the Cape Breton record should be added HANTS Co.: alluvium of Five-Mile River. See pp. 136, 170.

* ORYZOPSIS CANADENSIS (Poir.) Torr. *Stipa canadensis* Poir. Dry open barrens, Springhill Junction (Cumberland Co.); thence northward into New Brunswick and eastward to Prince Edward Island and Newfoundland. See p. 132.

O. ASPERIFOLIA Michx. Common on peaty or sterile woodland soil, throughout.

MUHLENBERGIA RACEMOSA (Michx.) B. S. P. Common in peaty swales and savannahs, apparently throughout.

Alopecurus geniculatus L. Recorded by Macoun only from Halifax, but common in ditches and shallow pools near towns in Yarmouth and Shelburne Cos.; also Baddeck. See p. 95.

** *A. geniculatus*, var. *microstachyus* Uechtr. in Fiek, Fl. von Schlesien, 500 (1881). This variety with small panicles (mostly 1–2 cm. long) is abundant in some roadside ditches at Yarmouth.

A. ARISTULATUS Michx. *A. geniculatus*, var. *aristulatus* (Michx.) Torr. CUMBERLAND Co.: spring-pools and ditches south of Amherst.

* SPOROBOLUS UNIFLORUS (Muhl.) Scribn. Not recorded in Macoun's *Catalogue* from Canada. Common in peat and wet sand from Yarmouth Co. eastward at least to Annapolis and Shelburne Cos.; also in Newfoundland. Recently collected about Georgian Bay, Ontario;—see J. M. Macoun, Ottawa Nat. xxiii. 192 (1910).

** AGROSTIS HYEMALIS (Walt.) B.S.P., var. *elata* (Pursh), n. comb. *Trichodium elatum* Pursh, Fl. Am. Sept. i. 61 (1814). *A. elata* (Pursh) Trin. Mém. Acad. St. Pétersb. sér. 6, vi. pt. 2, 317 (1841). *A. perennans elata* (Pursh) Hitchc. U. S. Dept. Agric. Bur. Pl. Ind. Bull. no. 68: 50 (1905). For discussion, see p. 155.

Known northeast of Long Island and Nantucket only from barrens of Nova Scotia, the Magdalen Islands and Newfoundland. The

following specimens, many of them distributed as *A. hyemalis*, var. *geminata* (Trin.) Hitchc. into which var. *clata* seems to pass, are characteristic. NEWFOUNDLAND: swampy woods, Bell Island, Conception Bay, *Howe & Lang*, no. 1302 (awned form with panicles 3 dm. long); serpentine tablelands, alt. 380 m., Bonne Bay, *Fernald & Wiegand*, no. 2514 (awned); open peat bogs, Birchy Cove (Curling), *Fernald & Wiegand*, no. 2513 (awned). MAGDALEN ISLANDS: wet bogs among the sand ridges back of the Narrows, Alright Island, *Fernald, Long & St. John*, no. 6850 (awnless); dry open woods and clearings and sphagnous bog near Étang du Nord village, Grindstone I., *Fernald, Bartram, Long & St. John*, nos. 6847, 6848 (awnless); wet bogs and mossy pond-margins among sandhills between East Cape and East Point, Coffin I., *Fernald, Long, & St. John*, no. 6851 (awned); dunes de la Pointe-de-l'Est, Ile de la Grande-Entrée, *Marie-Victorin & Rolland-Germain*, no. 9018 (awnless); sur la Dune du Nord, Grand Étang, *Marie-Victorin & Rolland-Germain*, no. 9017; dry clearing, Brion Island, *St. John*, no. 1766 (awnless). NOVA SCOTIA: Canso, *J. Fowler* (awned); Sable Island, *St. John*, nos. 1136, 1365 (awnless); springy sphagnous bog near mouth of Broad River, *Fernald & Bissell*, no. 19,913 (awnless); wet peaty sloughs in barrens, Lower Argyle, *Fernald, Bissell, Graves, Long & Linder*, no. 19,911 (awnless); swampy spruce woods, Belleville, *Long & Linder*, no. 19,900; sphagnous swale bordering Salmon (Greenville) Lake, Yarmouth Co., *Fernald, Bissell, Graves, Long & Linder*, no. 19,912 (awnless); dryish sphagnous swales and bogs by Harris's Lake, Tiddville, Digby Co., *Fernald & Long*, no. 19,914 (awnless).

* *A. PERENNANS* (Walt.) Tuckerm. Common throughout, especially in woodlands and thickets and on banks of streams. Highly variable and perhaps more than a single species.

CALAMAGROSTRIS PICKERINGII Gray. Boggy barrens, Digby and Yarmouth Cos. to Queens. Less common than the next. Previously recorded only from Cape Breton. See p. 161.

CALAMAGROSTIS PICKERINGII Gray, var. *DEBILIS* (Kearney) *Fernald & Wiegand*, *RHODORA*, xv. 135 (1913). Common on sphagnous bogs and peaty barrens, Digby and Yarmouth Cos. to Queens. Previously unknown between Massachusetts and Cape Breton. See pp. 99, 148.

* *C. NEGLECTA* (Ehrh.) Gaertn., Meyer & Scherb. Springy swales south of Amherst, thence common northward in eastern New Brunswick, Prince Edward Island and the Magdalen Islands. See p. 131.

AMMOPHILA BREVILIGULATA *Fernald*, *RHODORA*, xxii. 71 (1920). Common throughout, on sandy shores and dunes.

* *SPHENOPHOLIS PALLENS* (Spreng.) Scribn. Talus and crevices of gypsum cliffs, Port Bevis (Victoria Co.) and Five-Mile River (Hants Co.). See pp. 164, 170.

* *Avena fatua* L. Waste places, Yarmouth. See p. 136.

* *DANTHONIA COMPRESSA* Aust. Dry thickets and borders of woods, Yarmouth to Annapolis and Halifax Cos.

In Nova Scotia as elsewhere *Danthonia* is amazingly variable and it is impossible to draw lines with the definiteness of current treatments. The plant here treated as *D. compressa* is a good match for Austin's original material and may so pass until the genus can be satisfactorily studied.

** *SPARTINA ALTERNIFLORA* Loisel., var. *PILOSA* (Merr.) Fernald, *RHODORA*, xviii. 179 (1916). Marshes along Sissiboo River, Weymouth.

** *SIEGLINGIA DECUMBENS* (L.) Bernh. Peaty or wet sandy soils, YARMOUTH Co.: Cedar Lake; Yarmouth; Lily Lake; Arcadia; Trefry's Lake; Tusket. Possibly indigenous, but growing in half-cultivated areas. See pp. 95, 143, 151.

DISTICHLIS SPICATA (L.) Greene. Borders of salt marshes. YARMOUTH Co.: Sand Beach. VICTORIA Co.: Baddeck Bay. Recorded by Nichols from northern Cape Breton. See p. 164.

** *POA COSTATA* Schumacher, Enum. Pl. Saell. i. 28 (1801). See pp. 133, 139, 164. Mossy woods and glades. ANNAPOLIS Co.: southern slope of North Mt., near Middleton. HANTS Co.: Truro. VICTORIA Co.: Port Bevis.

P. TRIVIALIS L. Spruce swamps and springy ditches, Yarmouth and Shelburne Cos., often seeming like an indigenous plant as it does on Cape Cod and in Newfoundland.

P. SALTUENSIS Fernald & Wiegand, *RHODORA*, xx. 122 (1918). To the Cape Breton stations cited in the original description should be added HANTS Co.: woods along Five-Mile River. CUMBERLAND Co.: swampy woods, Springhill Junction.

* *GLYCERIA OBTUSA* (Muhl.) Trin. Common in peaty swales and bogs of Yarmouth Co. and southern Digby Co.

G. LAXA Scribn. Common in swales and borders of spruce swamps, Digby and Yarmouth Cos. to Queens. Reported by Nichols from Cape Breton. Common on Prince Edward Island.

** *G. GRANDIS* Watson, forma *pallescens*, n. f., spiculis flavescentibus.

Spikelets yellowish.—NOVA SCOTIA: brooksides and wet meadows, Yarmouth, July 4, 1920, *Bissell, Pease, Long & Linder*, no. 20,026 (TYPE in Gray Herb.). MAINE: Dover, September 1, 1894, *Fernald*, no. 564; Greenville, 1894, *Kate Furbish*.

* *G. PALLIDA* (Torr.) Trin. Boggy swales and savannahs of the Tusket River, Yarmouth Co. Previous records from Nova Scotia rest on the common *G. FERNALDII* (Hitchc.) St. John, *RHODORA*, xix. 76 (1917). See p. 166.

PUCCINELLIA MARITIMA (Huds.) Parl. Common on salt marshes and sea-strands from Shelburne and Yarmouth Cos. to Hants. See pp. 94, 102.

P. PAUPERCULA (Holm.) Fernald & Weatherby, var. *ALASKANA* (Scribn. & Merrill) Fernald & Weatherby, *RHODORA*, xviii. 18 (1916). Common on saline shores throughout the province.

FESTUCA RUBRA L., var. GLAUDESCENS (Hegetschw. & Heer) Richter. Sand dunes, Villagedale (Shelburne). Recorded by St. John from Sable Island.

* *F. capillata* Lam. Dry open soil, Shelburne and Yarmouth Cos. to Cumberland Co. Perhaps indigenous.

F. NUTANS Spreng. Alluvial woods, Five-Mile River (Hants). The old record from Halifax needs verification as the species belongs in rich alluvium or limy woodlands. See pp. 136, 170.

Bromus secalinus L. Railroad gravel along Five-Mile River (Hants).

* *B. commutatus* Schrad. Common in waste ground and about wharves or railroad yards, Yarmouth to Weymouth.

* *B. inermis* Leyss. Waste ground near wharf, Yarmouth.

AGROPYRON PUNGENS (Pers.) R. & S. Gravel beaches of Great Bras d'Or Lake, clearly passing into the next.

A. PUNGENS, var. **acadiense** (Hubbard), n. comb. *A. acadiense* Hubbard, RHODORA, xix. 15 (1917). Collected at the original station, gravel beach of Great Bras d'Or, Grand Narrows; also beaches of Kidstone Island and saline shore near mouth of George River. See p. 165.

A. REPENS (L.) Beauv., var. *PILOSUM* Scribn., Bull. U. S. Div. Agrost. no. 4, 36 (1897). A characteristic indigenous variety of the coast of New England and eastern Canada. Seen at various stations on the coast of Yarmouth Co.

** *A. CANINUM* (L.) Beauv., forma *GLAUCUM* Pease & Moore, RHODORA, xii. 71 (1910). Thicket at upper border of gravel beach of Great Bras d'Or, Kidstone Island (Victoria Co.).

* *A. CANINUM*, var. *TENERUM* (Vasey) Pease & Moore, RHODORA, (1910). *A. tenerum* Vasey. Thickets bordering sea-beaches and borders of brackish marshes or on limy talus. YARMOUTH Co.: beach of Eel Lake; marsh at head of Abram River. SHELBURNE Co.: Villagedale. QUEENS Co.: Port Mouton. HANTS Co.: gypsum cliffs, Five-Mile River. CAPE BRETON Co.: Grand Narrows.

** *ELYMUS VIRGINICUS* L., var. *HIRSUTIGLUMIS* (Scribn.) Hitchc. Barrier beach, Sand Beach (Yarmouth Co.). See p. 151.

E. ARENARIUS L., var. *VILLOSUS* E. Meyer. Gravelly strands of Yarmouth and Shelburne Cos. See p. 99.

* *ASPERELLA HYSTRIX* (L.) Humb. *Hystrix patula* Moench. Alluvial woods along Five-Mile River (Hants). See pp. 136, 170.

** *CYPERUS DENTATUS* Torr. Sandy and gravelly beaches of many lakes in Yarmouth Co. See p. 142.

* *ELEOCHARIS ROBBINSII* Oakes. Lake-margins and bog-pools. DIGBY Co.: Tiddville. YARMOUTH Co.: Argyle; Great Pubnico Lake. Collected by Howe & Lang at Windsor Junction, Halifax Co. See pp. 99, 149, 162.

* *E. OLIVACEA* Torr. Margin of pond-hole in the savannah along Little River, east of Tiddville, Digby Co. See p. 162.

E. OBTUSA (Willd.) Schultes. Seen in the southwestern counties only at Springhaven, Yarmouth Co. Frequent from Annapolis Co. eastward.

E. UNIGLUMIS Schultes. *E. palustris*, var. *glaucescens* of American authors. Brackish and saline shores, common.

** *E. TUBERCULOSA* (Michx.) R. & S., var. *pubnicoensis*, n. var., a forma typica differt squamis castaneis; setis perianthii laevibus; achaeniis superne evidenter constrictis pallide viridibus; tuberculo viridiscenti deltoideo-ovato vix inflato achaeniis minore.

Differing from the typical form in its castaneous scales: perianth-bristles smooth: achenes definitely constricted to a thick neck, pale green: tubercle greenish, deltoid-ovate, scarcely inflated, smaller than the achene.—NOVA SCOTIA: boggy savannah and sandy beach by Great Pubnico Lake, Yarmouth Co., September 6, 1920, *Fernald, Long & Linder*, nos. 20,163 (TYPE in Gray Herb.), 20,164. See pp. 167, 169.

In typical *E. tuberculosa* of the coastal plain the scales are paler, often whitish; the bristles barbed; the achene rarely with a definite neck and in maturity deeper colored or even olive and the whitish almost inflated tubercle closely sessile and usually as large as or larger than the achene.

** *E. ROSTELLATA* Torr. Saline or brackish marshes and swales of YARMOUTH CO.: Sand Beach, Chebogue, Tusket, Argyle. See pp. 103, 105, 110, 149.

SCIRPUS NANUS Spreng. Recorded by Macoun and by Nichols from Cape Breton, and by St. John from Sable Island. On several marshes of Digby and Yarmouth Cos.

* *S. PAUCIFLORUS* Lightf. Springy border of salt marsh at head of Baddeck Bay, Victoria Co. See p. 164.

S. CESPITOSUS L., var. *CALLOSUS* Bigel.; Fernald, *RHODORA*, xxiii. 24 (1921). Abundant on dryish peaty barrens of Digby, Yarmouth and Shelburne Cos. and on Cape Breton. Doubtless general on the Atlantic slope of the peninsula. See pp. 99, 148.

S. HUDSONIANUS (Michx.) Fernald. Frequent from Cape Breton to Digby Neck and Cumberland and Lunenburg Cos. See p. 131.

S. SUBTERMINALIS Torr. Sandy and peaty pools and lake-margins, Yarmouth Co. to Hants, and presumably general. Recorded by Macoun and by Nichols from northern Cape Breton. See p. 148.

S. RUFUS (Huds.) Schrad. Brackish or saline marsh, Sand Beach, Yarmouth Co. See p. 103. Recorded by Nichols from northern Cape Breton.

** *S. OLNEYI* Gray. Salt and brackish marshes and swales of YARMOUTH CO.: Sand Beach, Chebogue, Arcadia, Tusket, Eel Lake. See pp. 103, 110, 142.

S. VALIDUS Vahl. Brackish or calcareous pools, frequent throughout.

S. ACUTUS Muhl. *S. occidentalis* (Watson) Chase. Lake-margins, swales and brackish marshes, frequent throughout. See pp. 101, 110, 131.

* *S. CAMPESTRIS* Britton, var. *FERNALDII* (Bicknell) Bartlett. Salt marsh at head of Baddeck Bay. Frequent on the eastern coast of New Brunswick and on Prince Edward Island.

S. ATROVIRENS Muhl., var. *GEORGIANUS* (Harper) Fernald, *RHODORA*, xxiii. 134 (1921). Swales and damp thickets, occasional eastward to Halifax Co.

** *S. CYPERINUS* (L.) Kunth. Peaty and cobbly beach of a large lake north of Saller Lake, Kemptville (Yarmouth Co.). The common plant of Nova Scotia is var. *PELIUS* Fernald.

* *S. PEDICELLATUS* Fernald. Wooded bank of Sissiboo River, Weymouth.

* *ERIOPHORUM ANGUSTIFOLIUM* Roth, var. *MAJUS* Schultes. Boggy savannah bordering Great Pubnico Lake, Yarmouth Co. Typical *E. ANGUSTIFOLIUM* is very common throughout the province.

E. VIRIDI-CARINATUM (Engelm.) Fernald. Common on Cape Breton. Not seen west or southwest of Hants Co.

RYNCHOSPORA FUSCA (L.) Ait. Wet peaty and sandy bogs and shores, very common in Digby and Yarmouth Cos.; also Cape Breton.

* *R. CAPITELLATA* (Michx.) Vahl. See Blake, *RHODORA*, xx. 27 (1918). Frequent on lake-shores, savannahs and peaty openings in the western counties. *YARMOUTH CO.*: common in the Tusket Valley; Salmon (Greenville) Lake. *QUEENS CO.*: Port Mouton and Broad River. *HALIFAX CO.*: Shubenacadie Grand Lake. See p. 134.

** *R. CAPITELLATA*, var. *DISCUTIENS* (Clarke) Blake, l. c. 28 (1918). Local in *YARMOUTH CO.*: gravelly margin of Tusket (Vaughan) Lake; wet mossy brook-side by small pond near Argyle Head; sandy shore of Great Pubnico Lake. See pp. 149, 160.

** *CLADIUM MARISCOIDES* (Muhl.) Torr., forma **congestum**, n. f., inflorescentiis congestis radiis suppressis vel brevissimis, glomerulis plerumque e spiculis 15-30 compositis.

Inflorescences congested, the rays suppressed or very short; glomerules mostly with 15-30 spikelets.—*NOVA SCOTIA*: with the typical form of the species at peaty margin of Harris's Lake, Tiddville, Digby Co., August 22, 1920, *Fernald & Long*, no. 20,286 (TYPE in Gray Herb.).

** *CAREX SCOPARIA* Schkuhr, forma **peracuta**, n. f., spicis approximatis anguste rhomboideis apice valde attenuatis vel subcaudatis.

Spikes approximate, narrowly rhomboid, strongly attenuate or subcaudate at apex.—*NOVA SCOTIA*: springy ditch, Sand Beach, Yarmouth County, July 14, 1920, *Fernald & Long*, no. 20,296 (TYPE in Gray Herb.); damp roadside, east of Rockville, Yarmouth County, July 14, 1920, *Pease & Linder*, no. 20,289. See p. 107.

C. SCOPARIA, var. *SUBTURBINATA* Fernald & Wiegand, *RHODORA*, xiv. 116 (1912). Collected by us at one of the original stations, Meteghan; also at Deerfield, Yarmouth Co.

** *C. SCOPARIA*, var. *TESSELLATA* Fernald & Wiegand, *RHODORA*, xii. 135 (1910). Wet sandy and gravelly swales and roadsides, Belleville, Yarmouth Co. (scales almost black, darker than in the original material).

* *C. CRAWFORDII* Fernald. Swales and damp peaty barrens, Cumberland Co. to Cape Breton, west to Annapolis and Queens Cos.

C. PROJECTA Mackenzie. *C. tribuloides*, var. *reducta* Bailey. Meadows and damp thickets, apparently throughout the province. This includes the Nova Scotia material recorded by Macoun as *C. cristata*.

* *C. ALBOLUTESCENS* Schwein., var. *CUMULATA* Bailey. Dry or moist open barrens, frequent from Yarmouth to Lunenburg and Cumberland Cos., thence into New Brunswick and Prince Edward Island. Perhaps specifically distinct. See pp. 132, 138, 150. Ordinarily, the round-based spikes are densely crowded but in one collection (no. 20,311 from Broad River, Queens) a single tuft shows both crowded and moniliform inflorescences; the latter 1 dm. long, with 7 remote spikes.

** *C. albolutescens* var. *cumulata* × *scoparia*, n. hybr., *C. scoparium* simulans, sed foliis latioribus; spicis brunneis late obovoideis apice truncatis; perigyniis ovatis vel obovatis plerumque vacuis.

Similar to *C. scoparia* but with broader leaves: spikes brown, broadly obovoid, truncate at summit: perigynia ovate or obovate, mostly empty.—NOVA SCOTIA: with the parents but more abundant than either, damp *Polytrichum*-covered sandy plains, Middleton, Annapolis Co., July 20, 1920, Fernald, Pease & Long, no. 20,327 (TYPE in Gray Herb.). See p. 138.

** *C. STRAMINEA* Willd. Rare. YARMOUTH CO.: low woods and thickets by Butler's (Gavelton) Lake, Gavelton. SHELBURNE CO.: thicket bordering salt marsh, Villagedale; moist *Polytrichum*-covered barrens near Clement Pond, Barrington.

This is *C. straminea* as interpreted by Mackenzie (Bull. Torr. Bot. Cl. xlii. 605), a coastal plain species recognized by Mackenzie as extending from Louisiana to southern New York. Subsequently, Bicknell (Bull. Torr. Bot. Cl. xlv. 377) has reported it from Nantucket, Mr. F. C. Seymour has found it on Martha's Vineyard and I have collected it in swampy thickets on Cape Cod. The plant called *C. straminea* in Gray's Manual, ed. 7, is *C. tenera* Dewey.

C. HORMATHODES Fernald. Brackish or fresh marshes not far from the sea, common throughout the province. Macoun's report of *C. straminea*, var. *festuacea* from Baddeck was based on material of *C. hormathodes*.

C. SILICEA Olney. Sands, barrier beaches and rocks of the outer coast, from Yarmouth Co. to Cape Breton. See pp. 141, 150, 158.

* *C. BEBBII* Olney. Seen only in CAPE BRETON Co.: boggy swale on hillside near limestone quarry, George River. See p. 165.

* *C. FOENEA* Willd., var. *PERPLEXA* Bailey. Sandy thicket, Middleton, Annapolis Co. See p. 138.

C. leporina L. Common in springy or seepy fields and roadsides, Digby, Yarmouth and Shelburne Cos. See p. 95.

* *C. AENEA* Fernald. Apparently rare in Nova Scotia. YARMOUTH Co.: dry *Polytrichum*-covered barrens near head of Abram River. CUMBERLAND Co.: dry open barrens, Springhill Junction. See pp. 132, 142. Collected by Macoun at Point Pleasant, Halifax, this plant erroneously referred by me in Proc. Am. Acad. xxxvii. 471 (1902) to *C. pratensis* Drej.

C. EXILIS Dewey. Bogs and peaty barrens, throughout the province. See pp. 96, 161.

C. ATLANTICA Bailey. *C. sterilis* of Gray's Man. ed. 7. Common on bogs and peaty barrens from Yarmouth to Annapolis Co. and southeastern Guysboro Co. (Canso, Fowler). See pp. 96, 99, 104, 138.

** *C. HOWEI* Mackenzie, Bull. Torr. Bot. Cl. xxxvii. 245 (1910). *C. scirpoides*, var. *capillacea* (Bailey) Fernald. Wet woods and thickets and boggy swales, abundant in Digby and Yarmouth Cos. See pp. 96, 104.

C. DEWEYANA Schwein. Rich woods, Annapolis Co. to Victoria Co. See p. 136.

C. TRISPERMA Dewey, var. *BILLINGSII* Knight. Characteristic of dryish knolls in bogs and peaty barrens throughout the province; typical *C. TRISPERMA* being characteristic of mossy woods and wet thickets. See p. 99.

C. NORVEGICA Willd. To the few recorded stations may be added: salt marshes at Sand Beach and Chebogue (Yarmouth Co.) and marshes along George River (Cape Breton Co.). See p. 103.

C. TENELLA Schkuhr. Mossy woods, Hants and Halifax Cos. to Cape Breton.

C. ROSEA Schkuhr. To the very few recorded stations should be added: alluvial woods along Five-Mile River, Hants Co. See pp. 136, 170.

* *C. ROSEA*, var. *RADIATA* Dewey. Rich woods near gypsum cliffs along Five-Mile River, Hants Co.

* *C. VULPINODEA* Michx. Roadside ditch, Middleton, Annapolis Co.

C. DIANDRA Schrank. Springy bogs and swales, Cumberland and Hants Cos. to Cape Breton. See p. 131.

C. CRINITA Lam. Frequent in the western Counties. The easternmost specimens seen are from Pictou Co.

* *C. CRINITA*, var. *GYNANDRA* (Schwein.) Schwein. & Torr. Generally distributed from Yarmouth Co. to Cape Breton.

* *C. LENTICULARIS* Michx. Gravelly and sandy lake-margins, Yarmouth Co. to Halifax Co., and probably eastward. See p. 102.

C. GOODENOWII J. Gay, var. *STRICTIFORMIS* (Bailey) Kükenthal in Engler, Pflanzenr. iv. Fam. 20: 316 (1909). This is the most extreme variation we have of *C. Goodenowii*; being usually caespitose, with tall culms and conspicuously stipitate perigynia. Widely distributed in brackish or fresh soils in Nova Scotia. See p. 157.

C. AUREA Nutt. Damp calcareous or argillaceous soil, Annapolis Co. to Cape Breton. See pp. 133, 165, 170.

C. PAUCIFLORA Lightf. One of the most characteristic species of sphagnous bogs. See pp. 96, 99.

C. POLYGAMA Schkuhr. Occasional throughout the province in peaty or gravelly soils. See pp. 101, 135.

C. VIRESCENS Muhl., var. *SWANII* Fernald. Local in YARMOUTH Co.: dryish peaty barrens, Yarmouth; boggy pasture, Centre Chebogue.

C. GRACILLIMA Schwein. Dry or moist woods and thickets, Cumberland Co. to Digby Co. and Cape Breton.

* *C. UMBELLATA* Schkuhr., var. *TONSA* Fernald. Dry open soil, Yarmouth Co. to Lunenburg and Annapolis Cos. See p. 130.

C. VARIA Muhl. Abundant in dry or moist peaty soil, even on knolls in sphagnous bogs, Yarmouth and Shelburne Cos.

* *C. PENNSYLVANICA* Lam., var. *LUCORUM* (Willd.) Fernald. Dry rocky and gravelly soil by railroad, west of Bridgewater, Lunenburg Co. See p. 130.

C. PANICEA L. On damp argillaceous grassy or peaty slopes, local, perhaps introduced but now thoroughly naturalized. YARMOUTH Co.: Yarmouth; Chebogue; Lower Argyle. SHELBURNE Co.: Shag Harbor. See pp. 95, 155

C. EBURNEA Boott. Characteristic of dry crevices of gypsum outcrops. Recorded by Nichols from northern Cape Breton. Seen by us on gypsum at Five-Mile River (Hants) and Port Bevis (Victoria). See pp. 136, 164, 170.

C. LEPTONERVIA Fernald, RHODORA, xvi. 214 (1914). Rich woods and thickets, generally distributed through the province, but rare southwestward. Macoun's record of *C. laxiflora*, var. *patulifolia* was based on this species.

C. CONOIDEA Schkuhr. Sterile or peaty fields and meadows, frequent from Yarmouth to Halifax and Pictou Cos.

C. FLAVA L. Frequent or common throughout.

* *C. CRYPTOLEPIS* Mackenzie, Torreya, xiv. 157 (1914). Less common than *C. flava*. Seen by us only in HANTS Co.: swaley border of pond near Five-Mile River.

C. OEDERI Retz. YARMOUTH Co.: sphagnous swale bordering Beaver Lake; gravelly and rocky shore of Lake Annis. ANNAPOLIS Co.: swales and low pastures near Bay of Fundy, Margaretville, the long-spiked **forma *ELATIOR* (N. J. Anders.) Kükenth. Col-

lected in typical form at Baddeck, July 11, 1898, by John Macoun (no. 20,810; distributed as *C. extensa*).

C. OEDERI, var. *PUMILA* (Coss. & Germ.) Fernald. Common, and apparently freely hybridizing with *C. flava*.

C. ARCTATA Boott. Woods and rich thickets, Cumberland Co. to Digby Co. and Cape Breton.

C. SCABRATA Schwein. Alluvial woods, Annapolis Co. to Colchester Co.; Victoria Co. See pp. 136, 140.

C. OLIGOSPERMA Michx. Boggy swales and barrens, locally abundant. YARMOUTH Co.: Argyle; Kegeshook Lake. QUEENS Co.: Port Mouton. See pp. 99, 148, 167, 169.

* *C. RIPARIA* W. Curtis, var. *LACUSTRIS* (Willd.) Kükenthal. Local. YARMOUTH Co.: border of brackish marsh, Sand Beach. HANTS Co.: pond-hole near Five-Mile River. See p. 137.

C. PSEUDO-CYPERUS L. Frequent in boggy swales from Annapolis and Queens Cos. to Cape Breton.

C. RETRORSA Schwein. Alluvial woods and swales, Annapolis Co. to Cape Breton. See p. 164.

C. LUPULINA Muhl. Seen in western Nova Scotia only in a swale at Carleton, Yarmouth Co.

* *C. INTUMESCENS* Rudge, var. *FERNALDII* Bailey. Occasional throughout the province.

C. FOLLICULATA L. Recorded by Macoun from Halifax, by Nichols from northern Cape Breton. Characteristic of swales, boggy thickets and wet woods throughout the silicious regions of Digby and Yarmouth Cos.

C. VESICARIA, var. *JEJUNA* Fernald. DIGBY Co.: sandy beach of Lily Lake, Sandy Cove.

** *C. BULLATA* Schwein., var. *GREENEI* (Boeckl.) Fernald. Swales, boggy meadows, and wet woods, abundant from Digby, Yarmouth and Shelburne Cos. to Queens. See pp. 97, 99, 104, 150.

ARISAEMA TRIPHYLLUM (L.) Schott, var. *STEWARDSONII* (Britton) Stevens. The only material of *A. triphyllum* seen by us in Nova Scotia belonged to var. *Stewardsonii*. See p. 136.

CALLA PALUSTRIS L. Rare in western Nova Scotia. Seen only at the quaking margin of Trefry's Lake, Arcadia, Yarmouth Co. See p. 145.

SYMPLOCARPUS FOETIDUS (L.) Nutt. Springy swales, open bogs and boggy woods and thickets, frequent in Yarmouth and southern Digby Cos.

LEMNA TRISULCA L. CUMBERLAND Co.: spring-pools and ditches south of Amherst. Collected by me in 1902 at Sheffield's Mills, Kings Co. and reported by Macoun from Windsor. See p. 131.

L. MINOR L. CUMBERLAND Co.: pools south of Amherst. VICTORIA Co.: Port Bevis and Iona. Recorded by Macoun from stations from Pictou Co. to Hants Co. and collected by me in 1902 at Sheffield's Mills, Kings Co. See p. 131.

XYRIS MONTANA Ries. DIGBY Co.: wet peaty hollows in savannahs along Little River, east of Tiddville. YARMOUTH Co.: peaty sloughs and boggy barrens, many parts of Argyle. SHELburne Co.: damp sand-flats, Villagedale. Earlier records of *X. flexuosa* probably belong here. See pp. 99, 148, 149, 150, 161.

X. CAROLINIANA Walt. Wet sandy, gravelly or peaty borders of lakes, sloughs in boggy barrens, etc., common in Digby and Yarmouth Cos. and locally eastward at least to Halifax Co. Records of *X. bulbosa* probably belong here. See pp. 99, 104, 134, 157, 161.

JUNCUS BUFONIUS L., var. *HALOPHILUS* Buchenau & Fernald. YARMOUTH Co.: sandy border of salt marsh, Pubnico. QUEENS Co.: damp sand-flats, Central Port Mouton and at mouth of Broad River. See p. 158.

* *J. TENUIS* Willd., var. *WILLIAMSII* Fernald. Open grassy roadside, Tusket Falls, Yarmouth Co.

* *J. DUDLEYI* Wiegand. Swale at southern base of North Mountain, Middleton, Annapolis Co. See pp. 140, 170.

* *J. GREENEI* Oakes & Tuckerm. Sand dunes, Villagedale, Shelburne Co. See p. 150.

J. EFFUSUS L., var. *COMPACTUS* Lejeune & Courtois. Common throughout the province.

** *J. EFFUSUS*, var. *costulatus* n. var., caulibus gracilibus 0.4–1.2 m. altis basi 1.5–4 mm. diametro valde costulatis; cataphyllis basilariis chartaceis purpurascentibus vel fulvescentibus supremis griseo-stramineis basi purpurascentibus 0.5–2 dm. longis; inflorescentia laxa vel subcongesta 1–7.5 cm. diametro; sepalis petalisque subaequalibus 2–3 mm. longis subrigidis lanceolato-attenuatis stramineis; capsulis fulvis vel olivaceis retusis perianthium aequantibus vel eo paulo brevioribus.

Culms slender, 0.4–1.2 m. high, 1.5–4 mm. in diameter at base, strongly costulate: basal sheaths papery, purplish or reddish-brown; the upper grayish-stramineous, purplish at base, 0.5–2 dm. long; inflorescence lax or somewhat crowded, 1–7.5 cm. in diameter: sepals and petals subequal, 2.2–3 mm. long, rather rigid, lance-attenuate, stramineous: capsule reddish or olivaceous, retuse, equaling or but slightly shorter than the perianth.—Quebec, Prince Edward Island and Nova Scotia to South Carolina. The following, of many numbers examined, are characteristic. QUEBEC: vicinity of Cap à L'Aigle, August 18, 1905, *J. Macoun*, no. 68,858. PRINCE EDWARD ISLAND: fresh or slightly brackish reclaimed marshes along Hillsborough River, Mt. Stewart, July 30, 1912, *Fernald, Bartram, Long & St. John*, no. 7164; damp border of heath-barren, Lot 40, August 8, 1914, *Fernald & St. John*, no. 10,985. NOVA SCOTIA: low ground, Sydney, August 17, 1902, *Fernald*; wet sphagnous spruce bog near Louis Lake, Port Joli, August 17, 1920, *Fernald, Long & Linder*, no. 20,661; boggy barrens near Clement Pond, Barrington, August 9, 1920, *Fernald, Long & Linder*, no. 20,654 (TYPE in Gray Herb.);

spruce and red maple swamps by Trefry's Lake, Arcadia, July 29, 1920, *Fernald & Long*, no. 20,653. MAINE: border of salt marsh, Wells, August 8, 1916, *Fernald & Long*, no. 13,192. NEW HAMPSHIRE: by brook, East Andover, August 13, 1903, *M. A. Day*. MASSACHUSETTS: swale near Zion's Hill, Winchester, July 15, 1913, *Fernald*, no. 9173; sandy shore of Clear Pond, Lakeville, August 26, 1913, *Fernald & Long*, no. 9180; thin sphagnum peat overlying sand, Wareham, October 2, 1913, *Fernald & Long*, no. 9187; small quagmire in woods south of Sparrow Young's Pond, Chatham, July 15, 1918, *Fernald*, no. 16,538; boggy swale, Orleans, July 22, 1919, *Fernald & Long*, no. 18,202; border of cattail marsh, South Truro, August 10, 1919, *Fernald & Long*, no. 18,203; along Look's Brook, West Tisbury, Martha's Vineyard, July 26, 1916, *F. C. Seymour*, no. 1146; gutters in slightly sandy soil, Worthington, August 12, 1912, *B. L. Robinson*, no. 516. RHODE ISLAND: wet open sphagnum thickets, southwest of Harbor Pond, Block Island, August 19, 1913, *Fernald & Long*, nos. 9176, 9177. NEW JERSEY: Bear Swamp, Lawrenceville Sta., Mercer Co., June 20, 1913, *Bartram*. PENNSYLVANIA: Bush Hill Falls, Monroe Co., July 10-14, 1903, *Stone*, no. 5392. SOUTH CAROLINA: Florence, May 18, 1912, *Bartram*.

The coastal plain representative of the usually more northern var. *Pylaei* (Laharpe) *Fernald & Wiegand*, the latter plant having usually strongly costulate culms, but larger flowers (3-4.3 mm. long), with the sepals definitely exceeding the petals. In the Cape Cod region var. *costulatus* is the most abundant variety of *J. effusus* and in a letter concerning its occurrence in New Jersey Mr. E. B. Bartram wrote, under date of November 9, 1913: "When I first collected the New Jersey plant in June I was strongly impressed with the appearance it made in the field as compared with var. *solutus*. The two plants were common in the same marsh but they formed large colonies that could readily be distinguished from each other at a considerable distance. The darker colored and more compact inflorescences of the unnamed variety contrasted strongly with the lighter colored and more open inflorescences of var. *solutus*. In travelling to and from New York across the northern portion of the New Jersey coastal plain I was able to distinguish the two forms quite clearly from the train. From these observations I should say that the var. *solutus* is decidedly in the minority throughout the region between Trenton and New Brunswick. . . . We turned up the same thing in lower Delaware along the Indian River." See p. 145.

J. EFFUSUS, var. *SOLUTUS* *Fernald & Wiegand*, RHODORA, xii. 90 (1910). Common throughout the province.

* *J. EFFUSUS*, var. *PYLAEI* (Laharpe) Fernald & Wiegand, *RHODORA*, xii. 92 (1910). Open swampy thickets, Baddeck.

J. CANADENSIS J. Gay. Abundant in wet sandy or peaty soils, Yarmouth Co. to Annapolis and Queens Cos.

** *J. CANADENSIS* J. Gay, var. *sparsiflorus*, n. var., dense cespitosus robustus 6–8 dm. altus; inflorescentii 0.7–2 dm. longis, ramis erectis vel valde adscendentibus rigidis; capitulis discretis plerumque 3–7-floris; perianthiis 3.5–4 mm. longis.

Densely cespitose, robust, 6–8 dm. high: inflorescences 0.7–2 dm. long, with erect or strongly ascending rigid branches: heads scattered, mostly 2–7-flowered: perianths 3.5–4 mm. long.—NOVA SCOTIA: boggy savannah bordering Butler's (Gavelton) Lake, September 2, 1920, *Fernald & Long*, no. 20,685, September 4, *Fernald, Long & Linder*, no. 20,686 (TYPE in Gray Herb.); boggy savannah bordering St. John Lake, Springhaven, October 8, 1920, *Fernald & Linder*, no. 20,687. MASSACHUSETTS: sandy and peaty margin of pond between Grassy and Lower Simmons Ponds, Dennis, August 22, 1918, *Fernald & Long*, no. 16,549. See p. 166.

In typical *J. canadensis* the branches are less erect, the flowers very numerous in the glomerules and the perianths 2.5—rarely 3.5 mm. long.

** *J. SUBCAUDATUS* (Engelm.) Coville & Blake, var. *planisepalus*, n. var., a forma typica differt perianthiis 2–3 mm. longis; sepalis petalisque lanceolatis planis dorso viridibus; capsulis maturis valde exsertis.

Differing from the typical southern form in having the perianth 2–3 mm. long: sepals and petals lanceolate, flat and green on the back: mature capsule conspicuously exserted.—Savannahs, bogs and spruce swamps of Nova Scotia. DIGBY Co.: thickets bordering savannahs by Little River, east of Tiddville, August 22, 1920, *Fernald & Long*, no. 20,671 (TYPE in Gray Herb.). YARMOUTH Co.: sphagnous bog at edge of spruce swamp, Belleville, July 27, *Long & Linder*, no. 20,665; springy sphagnous spot at border of spruce woods near Randel Lake, Argyle, August 4, *Long & Linder*, no. 20,666; sphagnous swales bordering Salmon (Greenville) Lake, August 13, *Fernald, Bissell, Graves, Long & Linder*, no. 20,668; open grassy roadside, Tusket Falls, August 20, *Fernald, Bissell, Graves, Long & Linder*, no. 20,670; spruce and alder swamp, Pembroke Shore, October 6, *Fernald & Linder*, no. 20,723; boggy margin, East Branch of Tusket River, Quinan, October 8, *Fernald & Linder*, no. 20,672. SHEL-BURNE Co.: spruce swamp, Villagedale, August 7, *Fernald, Long & Linder*, no. 20,667. QUEENS Co.: springy sphagnous bog in spruce woods near mouth of Broad River, August 16, *Fernald & Bissell*, no. 20,669.

In the southern form of the species the perianths are 3–4 mm. long; the sepals and petals lance-linear and conspicuously ribbed or corrugated and the capsule commonly but little exserted. Some speci-

mens from southeastern Connecticut seem to be transitional. See pp. 142, 149, 156, 158.

J. PELOCARPUS Meyer. Although not recognized in Macoun's *Catalogue*, *J. pelocarpus* is characteristic of wet sandy shores throughout Nova Scotia.

J. MILITARIS Bigel. Typical of sandy and peaty lake-margins throughout the silicious regions of the province.

**J. ACUMINATUS* Michx. Local in YARMOUTH Co.: clayey roadside ditch, Yarmouth; springy ditches near Trefry's Lake, Arcadia; sandy and muddy tidal flats of Tusket River, Tusket Falls; springy ditches and wet roadsides, Abram River. Included in Lindsay's *Catalogue*, but apparently through error of determination. See pp. 105, 142.

J. ARTICULATUS L., var. *OBTUSATUS* Engelm. Common especially in brackish soil where it largely replaces the typical form of the species. See p. 142.

J. ARTICULATUS × *BREVICAUDATUS*. Abundant in peaty swales at Yarmouth. Less abundant on savannah near Tiddville, Digby Co. See p. 152.

J. ARTICULATUS × *CANADENSIS*. Dryish sphagnous swale, Tiddville, Digby Co.; sphagnous swale, Lower Argyle, Yarmouth Co.

J. ARTICULATUS × *NODOSUS*. Sterile plants with *J. articulatus* L. and *J. nodosus* L. in a brackish swale at Baddeck (*Fernald & Long*, nos. 20,721 and 20,722) seem to be of this origin.

J. MARGINATUS Rostk. Local in YARMOUTH Co.: springy ditches and wet roadsides, Abram River; wet clayey brookside, Argyle Head. Reported by Lindsay as collected by Sommers at Halifax. See pp. 142, 149.

**Ornithogalum umbellatum* L. Thoroughly naturalized with *Leucojum aestivum* and considered a troublesome weed in an old field, Yarmouth.

SMILACINA RACEMOSA (L.) Desf. Not seen southwest of Annapolis Co.

STREPTOPUS AMPLEXIFOLIUS (L.) DC. Not seen in the southwestern counties.

POLYGONATUM BIFLORUM (Walt.) Ell. Not seen in Yarmouth and Shelburne Cos

Convallaria majalis L. Somewhat established in woods near Yarmouth. See p. 95.

TRILLIUM ERECTUM L. Not seen west of Annapolis Co. See p. 140.

T. CERNUUM L. Not seen in the southwestern counties where *T. undulatum* Willd. is common.

SMILAX ROTUNDIFOLIA L. Thickets bordering lakes and rivers, frequent in Digby and Yarmouth Cos.; also seen along Sable River, Shelburne Co. See pp. 109, 145, 147.

** *S. ROTUNDIFOLIA*, var. *QUADRANGULARIS* (Muhl.) Wood. Frequent with the typical form or in separate colonies, Yarmouth Co. See pp. 144, 147.

LOPHIOLA septentrionalis, n. sp. Planta stolonifera caulibus solitariis vel laxe cespitosis 4–5.5 dm. altis; foliis linearibus imis usque 3 dm. longis 1.5–3.5 mm. latis plerumque 8-nerviis margine hyalinis basi deinde fulvis; inflorescentiis laxis paniculato-corymbiformibus 0.6–1.8 dm. altis 0.6–1.2 dm. latis, rhachi ramibusque imis valde adscendentibus sparse villosis vel glabratiss, pedicellis adscendentibus albedo-tomentosis plerumque 0.7–1.5 cm. longis; bracteis oblongo-lanceolatis scariosis fulvis; perianthiis 1.2–1.5 cm. diametro, segmentis patentibus vel reflexis lanceolatis subtus villosotomentosis supra fulvis apice glabris basi medioque longe villosobarbatis pilis aureis deinde flavescentibus; filamentis 3 mm. longis, antheris oblongis 1.2 mm. longis; capsulis rufescentibus vel fulvis conico-ovoideis rostratis fere basi liberis 4–4.5 mm. longis 3 mm. latis; seminibus fusiformi-obovatis vel clavatis vel semi-obovatis stramineis longitudinaliter obscure corrugatis 1–1.4 mm. longis apice rotundatis brunneo-tinctis basi plerumque caudatis.

Plant stoloniferous; the stems solitary or loosely cespitose (often with 2 or 3 flowering stems and many crowded leafy tufts), 4–5.5 dm. high: leaves linear; the lower up to 3 dm. long, 1.5–3.5 mm. wide, mostly 8-nerved, hyaline at margin, finally fulvous at base: inflorescences lax, paniculate-corymbiform, 0.5–1.8 dm. high, 0.6–1.2 dm. broad, the rhachis and strongly ascending lower branches sparingly villous or glabrate; the ascending pedicels white-tomentose, mostly 0.7–1.5 cm. long: bracts oblong-lanceolate, scarious, fulvous: perianths 1.2–1.5 cm. in diameter; the segments spreading or reflexed, lanceolate, villous-tomentous beneath, fulvous above and glabrous at tip but with the basal half or two-thirds villous-bearded with golden or finally only yellowish long crinkled hairs: filaments 3 mm. long; anthers oblong, 1.2 mm. long: capsules reddish or fulvous, conic-ovoid, beaked, free almost to the base, 4–4.5 mm. long (including the beak), 3 mm. broad: seeds fusiform-obovate, clavate or semi-ovate, straw-colored, longitudinally but obscurely corrugated, 1–1.4 mm. long, rounded and brown-tinged at apex, usually tailed at base. —NOVA SCOTIA: wet savannahs along Little River east of Tiddville, Digby Co., August 22, 1920, *Fernald & Long*, no. 20,784 (TYPE in Gray Herb.), October 13, 1920, *R. W. Sypher*, no. 20,785.

Differing from both *L. aurea* Ker, which extends from Mississippi to Florida and locally to South Carolina, and *L. americana* (Pursh) Wood of the New Jersey pine-barrens in its fulvous capsule free nearly to base and in its caudate-based seeds, both the more southern species having the green capsules adnate at least half their length to the perianth and the seeds rounded at both ends. *L. aurea* has

much coarser leaves, commonly 5–8 mm. wide with 10–14 nerves; very many more flowers on shorter pedicels, and smaller perianth with narrowly oblong segments with the shorter beard only at base. *L. americana* is usually lower and the splendid representation generously loaned me by the New York Botanical Garden, Academy of Natural Sciences of Philadelphia, United States National Museum and Missouri Botanical Garden shows no tendency to the cespitose or subcespitose habit of *L. septentrionalis*. *L. americana*, furthermore, has the much denser inflorescences heavily tomentose and with short pedicels. See further discussion on pp. 160–163, 168.

** *Leucojum aestivum* L. The Summer Snowflake of gardens is thoroughly naturalized with *Ornithogalum umbellatum* and considered a troublesome weed in an old field at Yarmouth.

"Thoroughly and abundantly established . . . in a brook whence it is rapidly spreading, Brunswick," Maine,—now established for about 40 years.—See Fernald, Proc. Portl. Soc. Nat. Hist. ii. 133 (1897).

IRIS SETOSA Pall., var. CANADENSIS Foster. Apparently not common west of Cape Breton. GUYSBOROUGH Co.: Canso, *Fowler*. QUEENS Co.: upper border of the beach, Central Port Mouton. ANNAPOLIS Co.: crests of basalt cliffs by Bay of Fundy, Margaretville. See p. 139.

Iris pseudacorus L. Well naturalized about pools and ditches, Yarmouth. See p. 95.

SISYRINCHIUM GRAMINEUM Curtis. Common in damp grassy, peaty or gravelly open places, Yarmouth Co. to Halifax Co. See pp. 95, 134, 147.

** S. ATLANTICUM Bicknell. Common in damp peaty, sandy or gravelly soil, Yarmouth Co. to Queens Co. See pp. 95, 99.

** S. ARENICOLA Bicknell. YARMOUTH Co.: dry sandy bank, Yarmouth. ANNAPOLIS Co.: damp *Polytrichum*-covered sandy plains, Middleton. See pp. 96, 138.

HABENARIA VIRIDIS (L.) R. Br., var. BRACTEATA (Muhl.) Gray. *H. bracteata* (Muhl.) R. Br. Rich woods, Folley, Colchester Co. See p. 136.

** H. FLAVA (L.) Spreng. YARMOUTH Co.: peaty and cobbly beach of Salmon (Greenville) Lake; wet peaty margin of Butler's (Gavelton) L., Gavelton; gravelly margin of Tusket (Vaughan) L.; sandy and cobbly beach of Fanning Lake, Carleton. Not known nearer than Trenton, New Jersey (see pp. 147, 148, 160, 168). The plant of eastern Nova Scotia (Boylston, *C. A. Hamilton*) is var. VIRECENS (Muhl.) Fernald, p. 148.

H. HYPERBOREA (L.) R. Br. Not seen west of Annapolis and Queens Cos.

H. OBTUSATA (Pursh) Richards. Not seen west of Colchester and Queens Cos.

H. HOOKERI Torr. Not seen west of Queens Co.

H. MACROPHYLLA Goldie. COLCHESTER Co.: rich woods, Folley. CAPE BRETON Co.: mixed woods, North Sydney. See p. 136.

H. BLEPHARIGLOTTIS (Willd.) Torr. Abundant on boggy barrens and even in dryish barrens and spruce thickets, Yarmouth Co.; seen only in peat overlying the gold-bearing series in southern Shelburne and Queens Cos. and not observed on the granitic areas. See pp. 90, 110, 142, 148, 157.

** *POGONIA OPHIOGLOSSOIDES* (L.) Ker, var. **brachypogon**, n. var., barba labii obsolescente; segmentis perianthii vix divergentibus; planta plerumque subcespitosa.

Beard of the lip obsolescent, represented by short knobs: segments of the perianth scarcely divergent: plant usually subcespitose.—NOVA SCOTIA: forming dense colonies, sandy and gravelly beach of Cedar Lake, Yarmouth Co., July 11, 1920, *Fernald, Bissell, Pease, Long & Linder*, no. 20,888 (TYPE in Gray Herb.); Cedar Lake, Digby Co., July 25, *Fernald, Bean & White*, no. 20,889; dryish upper cobbly beach of Jassy Lake, Lake Annis, July 29, *Bean, White & Linder*, no. 20,891; wet sandy and peaty pockets in cobble-beach of Trefry's Lake, Arcadia, July 29, *Fernald & Long*, no. 20,892.

Other material from Trefry's Lake (no. 20,881) and from Clearwater Lake, Belleville (no. 20,890) is transitional to the typical form of the plant with long beard on the lip. Some specimens from Newfoundland and the Magdalen Islands are also transitional. For further discussion see pp. 102, 140.

** *CALOPOGON PULCHELLUS* (Sw.) R. Br., forma **albiflorus** (Britton), n. comb. *C. tuberosus*, forma *albiflorus* Britton, Bull. Torr. Bot. Cl. xvii. 125 (1890). YARMOUTH Co.: a single plant, sandy and peaty margin of Lake Annis.

For note on generic and specific names see p. 132.

SPIRANTHES CERNUA (L.) Richard. Boggy meadows and clearings and sandy shores, Yarmouth Co. to Halifax Co.

** *S. CERNUA*, var. *ochroleuca* (Rydb.) Ames. YARMOUTH Co.: sandy fields and dry rocky barrens, Pubnico. See p. 167.

LIPARIS LOESELII (L.) Richard. Occasional in peaty meadows and peaty and cobbly lake-shores, Yarmouth and Digby Cos. See p. 141.

SALIX CORDATA Muhl. Not seen in Yarmouth, Shelburne, and Queens Cos., nor in southwestern Digby Co.

S. PYRIFOLIA Anderss. *S. balsamifera* Barratt. Swampy thickets throughout the province.

(To be continued.)

LATHYRUS NISSOLIA, A RECENT INTRODUCTION IN THE STATE OF WASHINGTON:—Early in May I observed on the Western slope of the dry hillside leading to the campus of the State College of Washington, Pullman, what appeared to be a grass, different from that commonly grown in this section. The shade of green was distinctly more vivid than that of the other plants by which it was surrounded. Several times during the month of May this spot was visited and attention was attracted to the rapid and very vigorous growth which this little plant was making. On June 6th, 1921, the first brilliant, crimson, papilionaceous flowers appeared and at the end of three weeks the plants were blooming in great profusion. In this new garb the grass-like appearance of the plant was altered by the bright flowers which showed it to be a member of the *Leguminosae*.

A single plant carelessly removed from the very shallow soil, where it was growing so well, revealed thickly noded rootlets. In the immediate vicinity there was growing very sparsely *Lathyrus Sandbergii* Howell. This was also in flower. The resemblance between the two was so great that the attempt was made to identify the former by aid of Piper and Beattie's Flora of Southeastern Washington and Adjacent Idaho, as a member of the same genus. No description in this flora covered this legume. The specimen was then given to Dr. Harold St. John, Professor of Botany in the State College of Washington, who identified it as *Lathyrus Nissolia* L.

An effort to account for the presence of this little pea growing in Pullman has resulted in failure. There is no record of this species ever having been planted here and a search through the literature fails to reveal any record of its introduction in North America. Pressed specimens have been placed in the herbarium of the State College of Washington and the Gray Herbarium, Cambridge, Mass.—CHARLES S. PARKER, Pullman, Washington.

Vol. 23, no. 272, including pages 181 to 200, was issued 15 December, 1921. The date of no. 273, still in press, will be announced later.

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